Blancett®
Turbine Flow Meters

Flow Monitor

B2800 Standard

Badger Meter

DSY-PM-00276-EN-02 (May 2015)

User Manual

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SCOPE OF THIS MANUAL

This manual is intended to help you get the B2800 flow monitor up and running quickly.

IMPORTANT

Read this manual carefully before attempting any installation or operation. Keep the manual accessible for future reference.

UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

SAFETY

Terminology and Symbols

⚠DANGER	Indicates a hazardous situation, which, if not avoided, is estimated to be capable of causing death or serious personal injury.
⚠WARNING	Indicates a hazardous situation, which, if not avoided, could result in severe personal injury or death.
⚠CAUTION	Indicates a hazardous situation, which, if not avoided, is estimated to be capable of causing minor or moderate personal injury or damage to property.

Considerations

The installation of the B2800 monitor must comply with all applicable federal, state, and local rules, regulations, and codes.

⚠WARNING

EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

⚠ AVERTISSMENT

RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CEMATÉRIEL INACCCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION 2.

⚠WARNING

DO NOT CONNECT OR DISCONNECT EITHER POWER OR OUTPUTS UNLESS THE AREA IS KNOWN TO BE NON-HAZARDOUS.

⚠ AVERTISSMENT

RISQUE D'EXPLOSION. NE PAS DÉBRANCHER TANT QUE LE CIRCUIT EST SOUSTENSION, À MOINS QU'LL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.

IMPORTANT

Not following instructions properly may impair safety of equipment and/or personnel.

INTRODUCTION

The B2800 flow monitor is a state-of-the-art digital signal processing flow monitor, designed to provide exceptional flexibility at a very affordable price. Though designed for use with Blancett flow meters, this display can be used with almost any flow meter producing a low amplitude AC output or contact closure signals.

This flow monitor is capable of accepting a low level frequency input for calculating flow rate and total. The calculations can then be displayed in the desired units of measurement. All B2800 flow monitors come pre-programmed from the factory, if ordered with a Blancett flow meter. If required, however, it can easily be reconfigured in the field. The monitor's large 8-digit by 0.75 in. (19.05 mm) numeric liquid crystal display makes extended range viewing practical. The second 8-digit by 0.38 in. (9.65 mm) alphanumeric display provides for selectable units viewing in run mode and prompts for variables in program mode. Finally, you can choose to display rate or total, or alternate between both rate and total.

OPERATING THE MONITOR

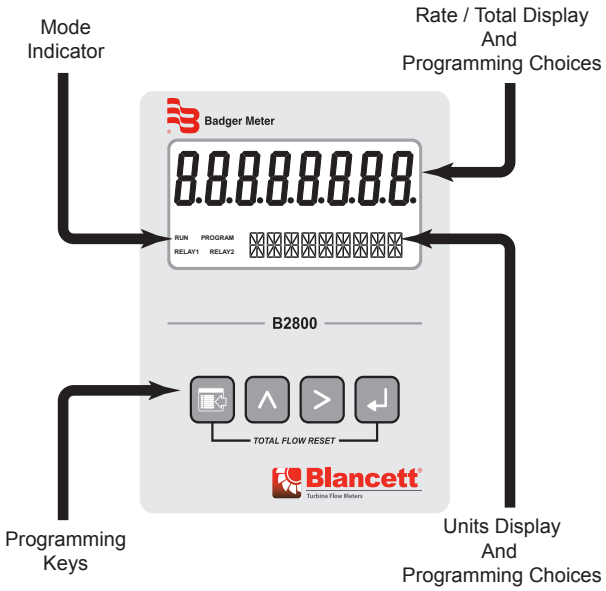


Figure 1: B2800 flow monitor

Buttons

	MENU	Switches to *PROGRAM* mode
	UP	Scrolls forward through the parameter options and increments numeric variables
	RIGHT	Scrolls backward through the parameter options and moves the active digit to the right
	ENTER	Saves programming information, advances to the next programming parameter, and used in the reset process

Modes

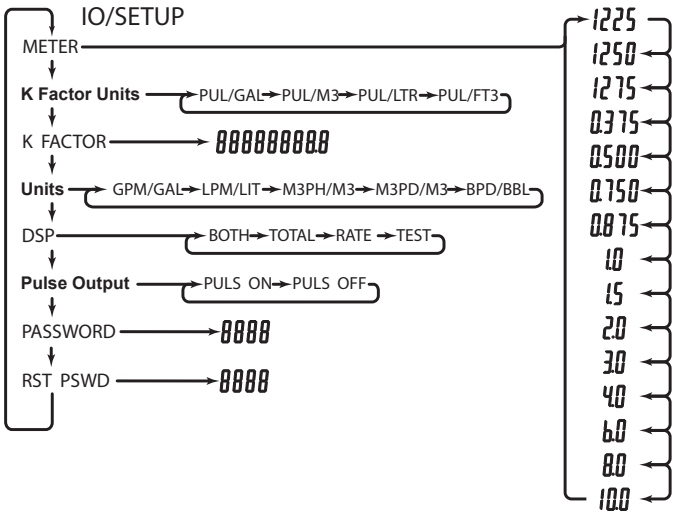
RUN	Normal operating mode
PROGRAM	Used to program parameters in the display

If your monitor was ordered with a Blancett flow meter, the two components ship from the factory calibrated as a set. If the monitor is a replacement, the turbine's K-factor has changed or the monitor is being used with some other pulse generating device, the monitor must be programmed.

PROGRAMMING

Each turbine flow meter is shipped with either a K-factor value or frequency data. If frequency data is provided, the data must be converted to a K-factor before programming the monitor. K-factor information, when supplied, can usually be found on the neck of the flow meter or stamped on the flow meter body. The K-factor represents the number of pulses per unit of volume. The K-factor is needed to program the monitor readout.

Programming Mode



Enter Program Mode

Press **MENU** to enter the programming mode. The mode indicator changes from *RUN* to *PROGRAM*.

Select Meter Size

At the *METER* prompt, press **UP** or **RIGHT** to scroll to the bore size of your meter. Press **ENTER** to save and advance to the *K-factor Units* parameter.

NOTE: The meter connection size and the bore size are different. For example, many of the one inch NPT turbines have bore sizes that range from 3/8…1 in. Be sure to use the correct bore size or the meter will report incorrect flows and totals.

Enter The K-Factor Unit

Press **UP** or **RIGHT** to scroll to the K-factor unit of the meter. Enter the unit that the meter was calibrated in.

Example
If the meter was calibrated in US gallons, use *PUL/GAL*.

Press **ENTER** to save the K-factor unit and advance to the *K FACTOR* parameter.

NOTE: Unless otherwise specified, Blancett turbine flow meters are supplied with K-factors measured in pulses per gallon (*PUL/GAL*) which will automatically convert to your desired units of measure.

Enter The Meter's K-Factor

NOTE: The K-factor supplied with the meter or calculated from calibration data is needed to set this parameter.

To change the K-factor value, press **RIGHT** to select the digit that you wish to change. Press **UP** to increment the digit until it matches the meter's K-factor. Repeat this process until all K-factor digits have been entered. Press **ENTER** to save the K-factor and advance to *RATE/TOTAL*.

Select the Units of Measure

The monitor is programmed with five common rate/total unit options. The monitor shows the rate/total unit that the display is currently set for. If the current selection is correct, press **ENTER** once to advance to the *DISPLAY FUNCTION* parameter. To change the unit, press **UP** or **RIGHT** to scroll to the correct rate unit. Press **ENTER** to save and advance to the *DISPLAY FUNCTION* parameter.

Selection	Rate	Total
GPM/GAL	Gallons per minute	Gallons
LPM/LIT	Liters per minute	Liters
M3PH/M3	Cubic meters per hour	Cubic meters
M3PD/M3	Cubic meters per day	Cubic meters
BPD/BBL	Oil barrels per day	Oil barrels

Select the Display Function

The monitor displays *RATE*, *TOTAL*, alternates between *BOTH* rate and total or *TEST*. If the current selection is correct, press **ENTER** to advance to the next parameter. To change to an alternate display mode, press **UP** or **RIGHT** to scroll to the correct display mode and press **ENTER** to save and advance to the *TOTALIZER PULSE OUTPUT* parameter.

The *TEST* function acts like a frequency counter and displays the raw input frequency being supplied to the frequency input terminals. This is very useful when troubleshooting flow problems.

Totalizer Pulse Output

The pulse output parameter can be enabled or disabled. When enabled this output generates 20 mS duration pulse for every time the least significant digit of the totalizer increments. The amplitude of the pulse is dependent on the voltage level of the supply connected to the pulse output and is limited to a maximum 30V DC. Press **UP** or **RIGHT** to scroll to *ON* or *OFF*. Press **ENTER** to save and advance to the *PASSWORD* parameter.

Password

The *PASSWORD* setting restricts access to *PROGRAM* mode. Initially, the password is set to all zeros and any user can modify the parameter settings in *PROGRAM* mode. To change the password, enter any four digit code. Press **UP** to increment the digit, and **RIGHT** to advance to the next digit. Press **ENTER** to store the password and advance to *RST PSWD*. The new password is now required to enter *PROGRAM* mode. With this password set, any user is able to reset the stored totals on the monitor.

Reset Password

The *RST PSWD* restricts resetting the totals on the monitor. The *PASSWORD* must also be set to restrict the total reset. Initially, the password is set to all zeros and any user can reset the stored totals on the monitor. To change the password, enter any four digit code. Press **UP** to increment the digit, and **RIGHT** to advance to the next digit. After entering all digits, press **ENTER** to store the password and return to *RUN* mode. The reset password is now required to reset the totals on the monitor.

Run Mode

Reset Total

To reset the monitor total display, in *RUN* mode press **MENU** and **ENTER** simultaneously. If the *RST PSWD* has been set to something other than the default, you must enter the new password before the monitor will reset. The monitor flashes *TOTAL RST* and returns to *RUN* mode at the conclusion of the reset procedure.

Store Total

The current total can be manually stored in the monitor's flash memory. Use this feature prior to replacing the battery. Press and hold **ENTER** for 2 seconds. The display responds with a flashing *TOTALSVD* and then returns to *RUN* mode.

Automatic Store Total

The monitor is equipped with a store total feature that works automatically, saving the current total to flash memory. The frequency of saves depends on the power supply option chosen.

Battery Powered: Once per hour and just before a low battery condition turns the unit off.
Loop Powered: Once every ten minutes.

ADDITIONAL SCALING PARAMETERS

NOTE: The programming instructions below are only available for loop powered units. Battery powered units do not include these programming parameters.

Flow 4 mA Setting

Zero is the default flow rate at the 4 mA setting. If the current selection is correct, press **ENTER** to advance to the *Flow 20 mA* parameter. To change the setting, press **UP** to increment the flashing digit and press **RIGHT** to move to the next digit. Press **ENTER** to save and advance to the *Flow 20 mA* parameter.

Flow 20 mA Setting

The turbine meter's maximum flow rate is the default value for the 20 mA setting. If the current selection is correct, press **ENTER** to advance to the *4…20 mA Calibration* parameter. To change the setting, press **UP** to increment the flashing digit and press **RIGHT** to move to the next digit. Press **ENTER** to save and advance to the *4…20 mA Calibration* parameter.

4…20 mA Calibration

The *4…20 mA Calibration* parameter is the fine adjustment of the 4…20 mA output. The 4 mA setting is typically between 35…50. To set the 4 mA value, connect an ammeter in series with the loop power supply. At the *4MA OUT* prompt, press **UP** to increment and **RIGHT** to decrement the 4 mA value to until a steady 4 mA reading is reached on the ammeter. Press **ENTER** to lock in this value and advance to *20MA OUT*. The 20 mA adjustment is performed using the same procedure as the 4 mA adjustment.

4…20 mA Test

The monitor contains a diagnostic routine that allows the simulation of mA values between 4…20 to check output tracking. At the *4-20TEST* prompt press **UP** to increment the simulated mA output or **RIGHT** to decrement the value in increments of 1 mA. The ammeter should track the simulated mA output. If a 4…20 mA test in not necessary, press **ENTER** once to escape the testing at any time.

NOTE: If you ordered the B2800 flow monitor with a Blancett turbine flow meter, the 4…20 mA was programmed and factory calibrated.

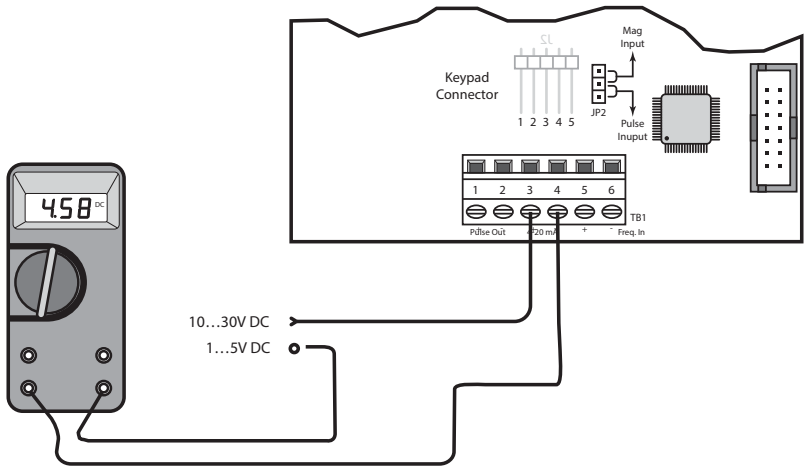


Figure 2: Typical ammeter connection

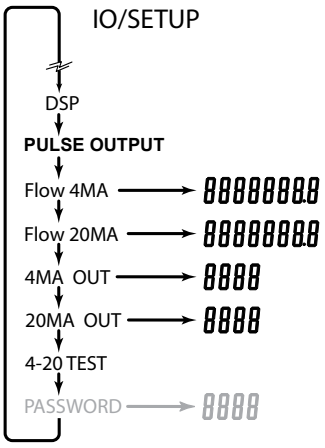


Figure 3: 4…20 mA programming menu

ADDITIONAL INPUT OPTIONS

The B2800 flow monitor is capable of receiving magnetic pickup input (small signal sine wave) or a contact closure input (pulse). Since most Blancett turbine flow meters use a magnetic pickup, the B2800 flow monitor is shipped configured for magnetic pickup input. To change to a contact closure input, remove JP2 from the top two pins and jumper them to the bottom two pins. See *Figure 5*.

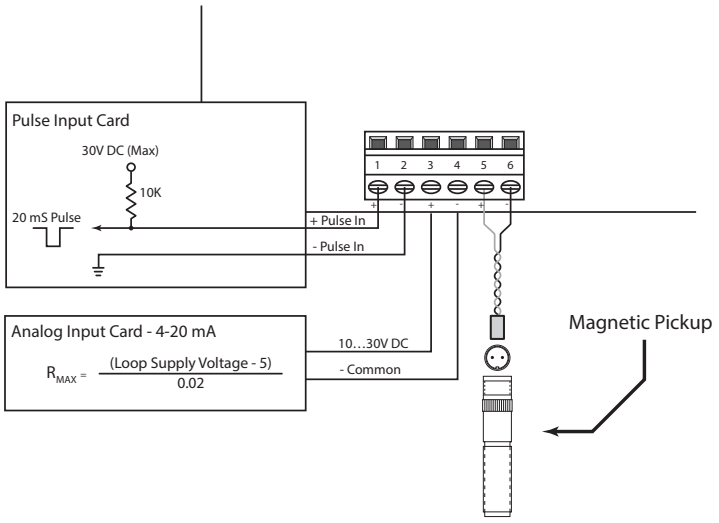


Figure 4: Wiring diagram

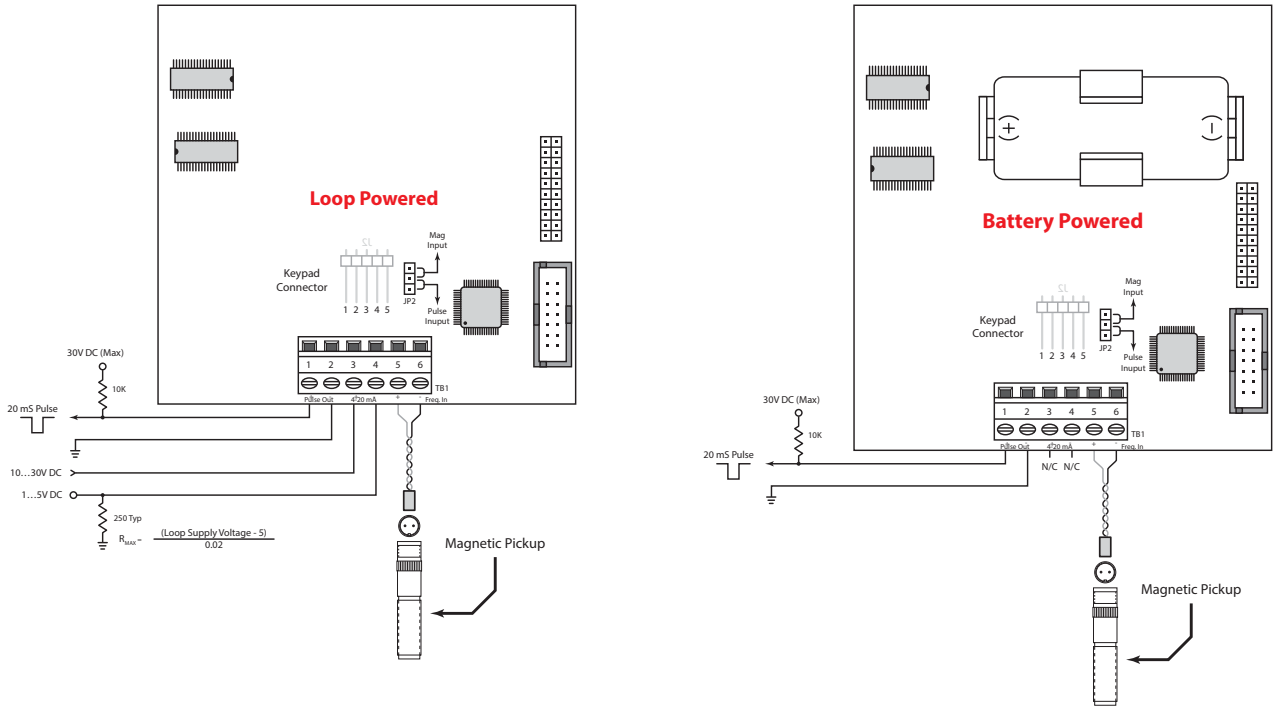


Figure 5: Circuit board layouts

DEFAULT K-FACTOR VALUES

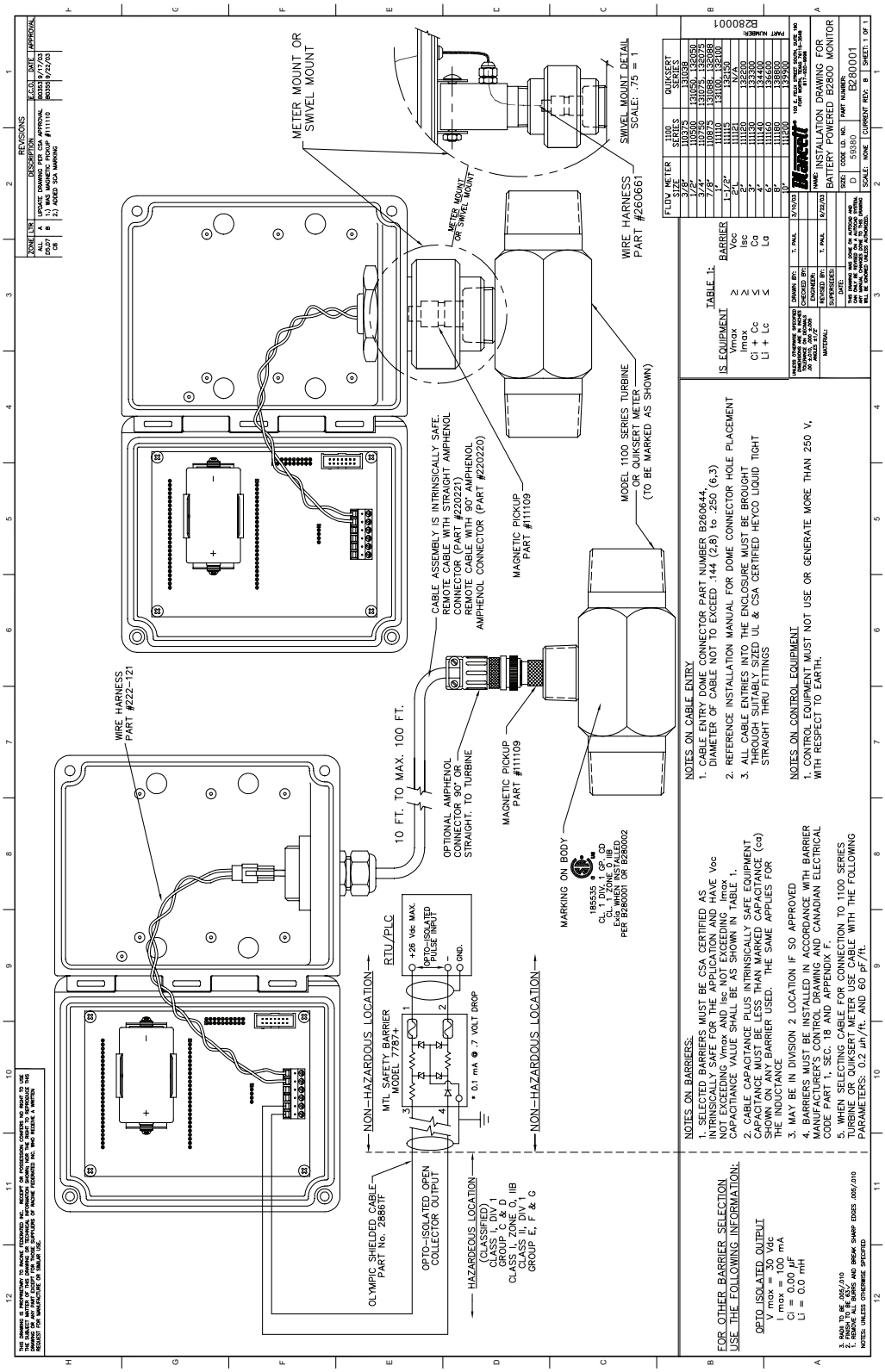
Meter Size	Default K-factor	Lower Limit	Upper Limit
3⁄8 in. (9.53 mm)	20,000	16,000	24,000
1/2 in. (12.7 mm)	13,000	10,400	15,600
3/4 in. (19.05 mm)	2750	2200	3300
7/8 in. (22.23 mm)	2686	2148	3223
1 in. (25.4 mm)	870.0	696.0	1044
1-1/2 in. (38.1 mm)	330.0	264.0	396.0
2 in. (50.8 mm)	52.0	41.6	62.0
3 in. (76.2 mm)	57.0	45.6	68.0
4 in. (101.6 mm)	29.0	23.2	35.0
6 in. (152.4 mm)	7.0	5.6	8.0
8 in. (203.2 mm)	3.0	2.4	4.0
10 in. (254 mm)	1.6	1.3	2.0

BATTERY REPLACEMENT

Battery powered monitors use a single 1.5V, D size alkaline battery. When replacement is necessary, use a clean fresh battery. Save the total to memory before the battery is removed.

Unscrew the two captive screws on the front panel to access the battery. Replace the battery, being sure to observe the proper polarity, and then refasten the front panel.

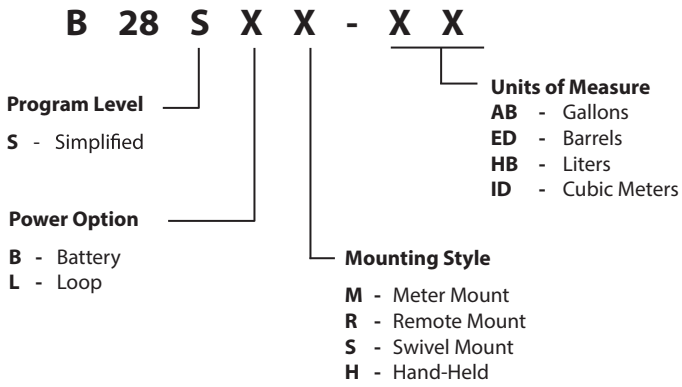
INSTALLATION DRAWING


METER MOUNT OR SWIVEL MOUNT
SWIVEL MOUNT DETAIL SCALE: .75 = 1
WIRE HARNESS PART #260661
WIRE HARNESS PART #222-121
10 FT. TO MAX. 100 FT.
CABLE ASSEMBLY IS INTRINSICALLY SAFE. REMOTE CABLE WITH STRAIGHT AMPHENOL CONNECTOR (PART #220221) REMOTE CABLE WITH 90° AMPHENOL AMPHENOL CONNECTOR (PART #220220)
MAGNETIC PICKUP PART #111109
MODEL 1100 SERIES TURBINE OR QUIKSERT METER (TO BE MARKED AS SHOWN)
OPTIONAL AMPHENOL CONNECTOR 90° OR STRAIGHT TO TURBINE
MARKING ON BODY
185535 CL. 1 DIV. 1 GP. CD Ex ia IIB T4 Ga PER B280001 OR B280002
NON-HAZARDOUS LOCATION
RTU/PLC
MTL SAFETY BARRIER MODEL 7787+
+26 Vdc MAX.
OPTO-ISOLATED PULSE INPUT
GND.
* 0.1 mA @ .7 VOLT DROP
OLYMPIC SHIELDED CABLE PART No. 2886TF
OPTO-ISOLATED OPEN COLLECTOR OUTPUT
HAZARDEOUS LOCATION (CLASSIFIED) CLASS I, DIV 1 GROUP C & D CLASS I, ZONE 0, IIB CLASS II, DIV 1 GROUP E, F & G
NOTES ON BARRIERS:
1. SELECTED BARRIERS MUST BE CSA CERTIFIED AS INTRINSICALLY SAFE FOR THE APPLICATION AND HAVE Voc NOT EXCEEDING Vmax AND Isc NOT EXCEEDING Imax CAPACITANCE VALUE SHALL BE AS SHOWN IN TABLE 1.
2. CABLE CAPACITANCE PLUS INTRINSICALLY SAFE EQUIPMENT CAPACITANCE MUST BE LESS THAN MARKED CAPACITANCE (ca) SHOWN ON ANY BARRIER USED. THE SAME APPLIES FOR THE INDUCTANCE
3. MAY BE IN DIVISION 2 LOCATION IF SO APPROVED
4. BARRIERS MUST BE INSTALLED IN ACCORDANCE WITH BARRIER MANUFACTURER'S CONTROL DRAWING AND CANADIAN ELECTRICAL CODE PART 1, SEC. 18 AND APPENDIX F.
5. WHEN SELECTING CABLE FOR CONNECTION TO 1100 SERIES TURBINE OR QUIK-SERT METER USE CABLE WITH THE FOLLOWING PARAMETERS: 0.2 µH/ft. AND 60 pF/ft.
FOR OTHER BARRIER SELECTION USE THE FOLLOWING INFORMATION:
OPTO ISOLATED OUTPUT
V max = 30 Vdc
I max = 100 mA
Ci = 0.00 µF
Li = 0.0 mH
NOTES ON CABLE ENTRY:
1. CABLE ENTRY DOME CONNECTOR PART NUMBER B260644. DIAMETER OF CABLE NOT TO EXCEED .144 (2.8) to .250 (6.3)
2. REFERENCE INSTALLATION MANUAL FOR DOME CONNECTOR HOLE PLACEMENT
3. ALL CABLE ENTRIES INTO THE ENCLOSURE MUST BE BROUGHT THROUGH SUITABLY SIZED UL & CSA CERTIFIED HEYCO LIQUID TIGHT STRAIGHT THRU FITTINGS
NOTES ON CONTROL EQUIPMENT
1. CONTROL EQUIPMENT MUST NOT USE OR GENERATE MORE THAN 250 V. WITH RESPECT TO EARTH.
TABLE 1:
IS EQUIPMENT / BARRIER
Vmax ≥ Voc
Imax ≥ Isc
Ci + Cc ≤ Ca
Li + Lc ≤ La
FLOW METER SIZE | 1100 SERIES | QUIKSERT SERIES
3/8" | 110375 | 131038
1/2" | 110500 | 131050, 132050
3/4" | 110750 | 131075, 132075
1" | 110975 | 131088, 132088
1-1/2" | 111110 | 131100, 132100
2" | 111120 | 131200
2-1/2" | 111121 | N/A
3" | 111150 | 132300
4" | 111140 | 134400
6" | 111160 | 136600
8" | 111180 | 138800
10" | 111200 | 139200
PART NUMBER: B280001
REVISIONS
ZONE | LTR | DESCRIPTION | E.C.O.# | DATE | APPROVAL
ALL | A | UPDATE DRAWING FOR APPROVAL | 80335 | 9/22/03
D&D/T | B | 1.) WAS MAGNETIC PICKUP #111110 | 80335 | 9/22/03
CS | | 2.) ADDED SCA MARKING
DRAWN BY: T. PAUL 3/10/03
CHECKED BY:
ISSUED BY:
REVISED BY: T. PAUL 9/22/03
SUPERSEDES:
DATE:
MATERIAL:
TITLE: INSTALLATION DRAWING FOR BATTERY POWERED B2800 MONITOR
SIZE: D | CODE I.D. NO.: 59380 | PART NUMBER: B280001
SCALE: NONE | CURRENT REV.: B | SHEET 1 OF 1
100 Ea. FLEX METER (PLUS, PULSE, NO PULSE) WITH 1 PART NUMBER: #111-XXX-XXX
THIS DRAWING IS PROPRIETARY TO NEPTUNE CHEMICAL PUMP CO., INC. NEITHER OUR POSSESSION CONVEYS NO RIGHT TO USE THE SUBJECT MATTER THEREOF FOR ANY PURPOSE WHATSOEVER NOR TO REPRODUCE OR ANY PART THEREOF FOR THOSE SUPPLIERS OF MACHINE DESIGNED TO NEPTUNE CHEMICAL PUMP CO., INC. WITHOUT EXPRESS WRITTEN PERMISSION OF NEPTUNE CHEMICAL PUMP CO., INC. AND FURNISH A WRITTEN
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS ANGLES ±1/2°
MACHINED SURFACES TO BE 125 µ RMS OR BETTER
BREAK ALL SHARP EDGES .005/.010
REMOVE ALL BURRS AND BREAK SHARP EDGES .005/.010
NOTES: UNLESS OTHERWISE SPECIFIED

TROUBLESHOOTING GUIDE

Issue	Remedy
No LCD display	• Check battery voltage. Should be 1.5V DC. Replace if low or bad.
No rate or total displayed	• Check connection from meter pickup to display input terminals. • Check turbine meter rotor for debris. Rotor should spin freely. • Check programming of flow monitor.
Flow rate display interprets reading constantly	• This is usually an indication of external noise. Keep all AC wires separate from DC wires. • Check for large motors close to the meter pickup. • Check for radio antenna in close proximity. • Try disconnecting the pickup from the monitor pig tail. This should stop the noise.
Flow rate indicator bounces	• This usually indicates a weak signal. Replace pickup and/or check all connections. • Check K-factor.

PART NUMBERING INFORMATION



SPECIFICATIONS

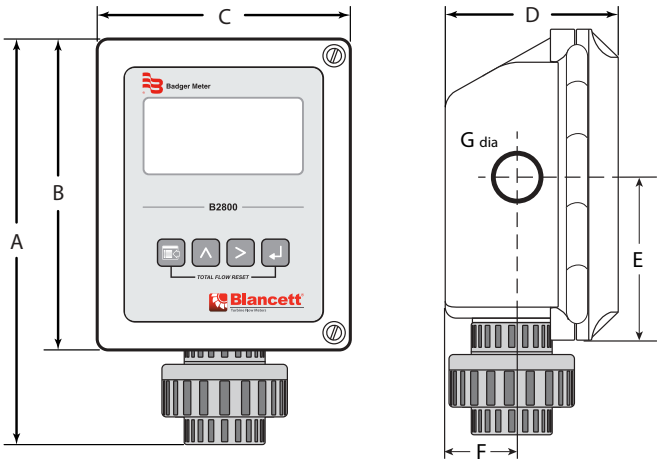
Power Supply Options	
Battery Powered	One D size, 1.5V alkaline battery
Loop Powered	Optional 4…20 mA loop power
Alphanumeric Rate and Total Display	
Eight digit, 0.75 inch high numeric display Eight character, 0.38 inch high alphanumeric display	
Fixed or toggle modes of operation for flow rate and totalizer display	
Accuracy	±0.1%
Temperature Drift	50 ppm /° C (maximum)
Mounting Classification	
Meter Mount	Type 4X enclosure
Remote Mount	Type 4X enclosure
Swivel Mount	Type 4X enclosure
Environmental	
Operating Temperature	–22…158° F (–30…70° C)
Humidity	0…90% non-condensing
Inputs	
Magnetic Pickup Input	Frequency Range: 0…3500 Hz Trigger Sensitivity: 30 mV p-p Over Voltage Protected: ±30V DC
Outputs	
Type	Opto-isolated open collector transistor
Maximum Voltage	30V DC
Pulse Width	20 mS/maximum rate 20 Hz
Current (ON state)	0.9V drop @ 5.0 mA or 0.7V drop @ 0.1 mA
Optional	4…20 mA output
Certifications	
CSA	Class I, Div 1 Groups C, D; Class II, Div 1 Groups E, F, G; CSA C22.2 No. 157-92, UL 913
CE	IEC 61326-1

REPLACEMENT PARTS

Component	Part Number
Keypad	B260713
Battery	B280601
Battery Tie Wrap	B228036
Pickup Cable	B222-121
Desiccant Bag	B260630
PVC Union	B220016
PVC Reducer Bushing	B220056
Rubber Washer	B228207
Steel Lock Washer	B220018
PCB Shield (battery units)	B280603
Desiccant Shield	B280680
Cord Grip	B220103

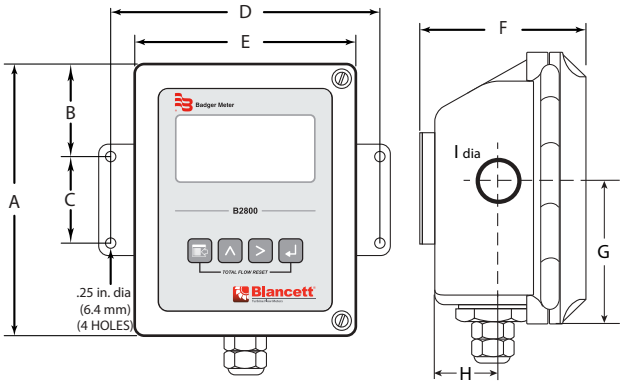
MOUNTING OPTIONS AND DIMENSIONS

Meter Mount



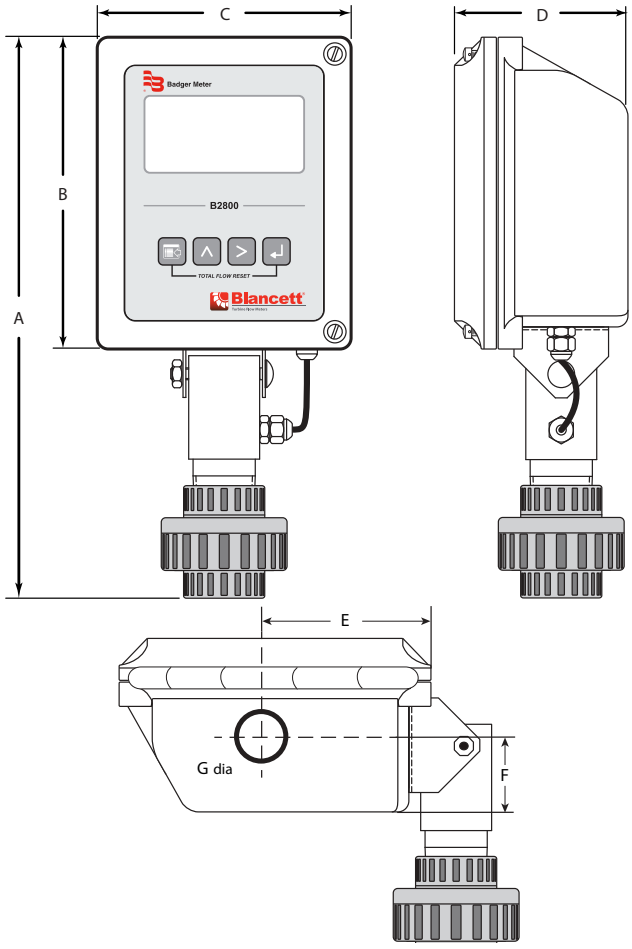
A	B	C	D	E	F	G dia
9.25 in. (235.0 mm)	7.00 in. (177.8 mm)	5.75 in. (146.0 mm)	4.00 in. (101.6 mm)	3.45 in. (87.6 mm)	1.50 in. (38.1 mm)	0.875 in. (22.2 mm)

Remote Mount



A	B	C	D	E	F	G	H	I dia
7.00 in. (177.8 mm)	2.40 in. (61.0 mm)	2.25 in. (57.2 mm)	7.00 in. (177.8 mm)	5.75 in. (146.0 mm)	4.38 in. (111.2 mm)	3.45 in. (87.6 mm)	1.50 in. (38.1 mm)	0.875 in. (22.2 mm)

Swivel Mount



A	B	C	D	E	F	G dia
12.25 in. (311.2 mm)	7.00 in. (177.8 mm)	5.75 in. (146.0 mm)	4.00 in. (101.6 mm)	3.45 in. (87.6 mm)	1.50 in. (38.1 mm)	0.875 in. (22.2 mm)

Control. Manage. Optimize.

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